Flight Simulator Airport Simulation Requirements

FSTD Guidance Bulletin 03-01

The current Advisory Circulars, AC 120-40B and Draft C, require visual system airport models for flight simulators as follows:

A. A minimum of one (1) airport model for Level A and Level B simulators.

B. A minimum of three (3) airport models for Level C and Level D simulators.

C. Each model provided must be of an airport contained in the applicable FAA-approved flight training program.

D. Each airport model provided must meet the standards as outlined in this document, with the exception of models or scenes that may be provided for specific purposes. (See note 1)

E. Each runway (defined as a 'one-direction' rectangular surface depiction in an airport visual scene used for taking off or landing) that can be designated as 'in-use' in models used to meet the requirements for a level A, B, C, or D simulator, must meet the requirements of this document and be qualified by the National Simulator Program Manager (NSPM).

F. With the concurrence of the Training Program Approval Authority (TPAA) a sponsor may add, in compliance with the requirements of this document, additional airport models (i.e., beyond the minimum requirement) or, qualify additional runways in an airport model at any time without further involvement of the NSPM. The TPAA is the Principal Operations Inspector (POI), the Training Center Program Manager (TCPM), or the assigned FAA operations inspector.

G. Table 1 is provided to clarify the minimum requirements for what must be provided in a Flight Simulator as airport visual models, scenes, or databases and also identifies the other aspects of the airport environment simulation that must correspond with that model. It is important that a visual system's capabilities are balanced between providing airport models with an accurate representation of the airport and a realistic representation of the surrounding environment to the extent possible.

Table 1

Ref #	Requirement Description	Simulator Level		
		A/B	C	D
A	**All runways while designated as an in-use runway must include the following detail that is either modeled using airport pictures, construction drawings and maps, ARINC 424 data or other appropriate data (preferred), or modeled in accordance with published regulatory material. It is expected that all airport models designed for visual systems manufactured after 1994 will have all runways available for use as defined in this document. The FAA realizes that it is not possible, nor is it required to provide every detail of a runway, but the detail that is provided should be correct within reasonable limits.**			
A-1	The surface and markings for that runway including: a) Threshold markings b) Runway numbers (see note 2) c) Touchdown zone markings d) Fixed distance markings e) Edge markings f) Centerline stripes	**X**	**X**	**X**
A-2	The runway lighting for that runway, modeled with the appropriate color and directionality including: a) Threshold lights b) Edge lights c) End lights d) Centerline lights, if appropriate e) Touchdown zone lights, if appropriate f) Leadoff lights, if appropriate g) Appropriate visual landing aid(s) for that runway h) Appropriate approach lighting system for that runway	**X**	**X**	**X**
A-3	The taxiway surface and markings associated with that runway including: a) Edge b) Centerline c) Runway hold lines d) ILS critical area markings		**X**	**X**
A-4	The taxiway lighting (see note 4) associated with that runway	**X**	**X**	**X**

	including: a) Edge b) Centerline c) Runway hold and ILS critical area lights			
A-5	Airport signage associated with that runway to the extent possible dependent upon the visual system capabilities. (See note 3)			**X**
B	**Other required visual airport model details. These details do not have the significance that the runway in-use has, but are needed to enhance the realism of the visual presentation.**			
B-1	Models of airports with more than one runway must have all significant runways not 'in-use' visually defined for airfield / runway recognition purposes. The correct lighting for each runway is preferred, and expected if the visual system has the capability, but the use of white or off white light strings that identify the runway threshold, edges, and end for twilight and night scenes are acceptable for this identification. Rectangular surface depictions are acceptable for daylight scenes.	**X**	**X**	**X**
B-2	Representative terminal buildings, structures and lighting to the extent possible dependent upon the visual system capabilities.		**X**	**X**
B-3	To support LOFT training, appropriate ramps and terminal buildings with at least one (1) useable gate positioned at the appropriate height with docking aids or an airplane ground marshaller. (This is required only for those airplanes that typically operate from terminal gates)		**X**	**X**
B-4	To support LOFT training, taxiway markings and lighting with airport signage should be provided to facilitate taxiing between one of the qualified runways and the terminal gate or ramp parking area to the extent possible dependent on the visual system capabilities. (See notes 3 & 4)		**X**	**X**
B-5	Representative depiction of significant and identifiable natural and cultural features within 25 NM of the modeled airport to the extent possible dependent upon the visual system capabilities. This refers to natural and cultural features that are typically used for pilot orientation in flight. Outlying airports not intended for landing need only provide a reasonable facsimile of runway orientation		**X**	**X**
C	**Required visual model correlation with other aspects of the airport environment simulation:**			

C-1	The airport model must be properly aligned with the navigational aids that are associated with operations at the airport / runway.	**X**	**X**	**X**
C-2	Threshold/touchdown zone elevations and locations must be appropriate for each runway qualified for use and provide sufficient correlation with airplane systems (e.g., HGS, GPS, Altimeter).	**X**	**X**	**X**
C-3	Slopes in runways, taxiways, and ramp areas must not cause distracting or unrealistic effects.	**X**	**X**	**X**
C-4	The simulation of runway contaminants must be correlated with the displayed runway surface and lighting where applicable.			**X**
D	**Specific requirements that must be contained in at least one of the three models provided to qualify a level C or D simulator as applicable:**			
D-1	A model which portrays representative physical relationships known to cause landing illusions, for example short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path and unique topographic features.			**X**
D-2	A model, which has the capability to present ground and air hazards such as another airplane crossing the active runway.		**X**	**X**
D-3	A model must have the capability to display runway surface contaminants including runway lighting reflections for wet, partially obscured lights for snow, or suitable alternative effects.			**X**
D-4	A simulator used for Surface Movement and Guidance Control system (SMGCS) training, testing, or checking must have at least one (1) SMGCS airport model with proper markings, signs, and surface lighting for at least one (1) qualified runway including signage (see note 3) for the taxiways to and from a terminal or ramp area.		**X**	**X**
D-5	A simulator used for Land and Hold Short Operations (LAHSO) training, testing, or checking must have at least one (1) airport model where at least one (1) qualified runway contains the proper markings, signs (see note #3), and surface lighting for LAHSO operations on that runway.		**X**	**X**

In addition to the requirements in Table 1, Simulators requiring Level C or D Initial or Upgrade evaluations after April 15, 2004, must meet the following airport simulation requirements:

1. All airport models, except those available for special purposes, must have one significant runway that would be used by the simulated aircraft type, available for use and meet the requirements defined in this document for in-use runways.

2. Additional airport or in-use runway detail that is required:

   a) Any runway designated as in-use must have signage provided that is associated with it

   b) A wind sock that gives appropriate wind cues

   c) Representative moving and static gate clutter (e.g., other airplanes, power carts, tugs, fuel trucks, additional gates)

   d) Representative moving and static ground traffic (e.g., vehicular and airplane)

3. At least one airport model must be an airport with two parallel runways and one crossing runway displayed simultaneously that meet the requirements defined in this document.

Notes:

1. Airport / runway visual models or scenes may be provided for "specific purposes." Such scenes may, for example, be dedicated to very low visibility (e.g., Cat II or Cat III) conditions and may visibly present only that portion of the model that would be visible to the flight crew under such visibility conditions. As a result, these scenes may or may not include taxiways, ramp or gate areas, terminal buildings, or other such features. However the appropriate navigational aid(s) and approach lighting system(s) for that runway must be operationally correct and properly aligned for that runway and airport scene. Each such "specific purpose" visual model must provide that portion of the visible scene necessary to accomplish the "specific purpose" for which it is included in the available model, and, as a result, may or may not, at the discretion of the TPAA, require runway numbers.

2. Runway numbers are an integral part of runway markings and, unless otherwise addressed in these footnotes, are required as part of the airport visual model displayed. However, because of the limitations of early Computer Generated Image (CGI) visual systems, the runway scenes generated with some of those early systems are not required to display runway numbers **except** for those runways used for LOFT training sessions. These LOFT airport models will require runway numbers but only for the specific runway end (one direction) used in the LOFT session. The systems required to display runway numbers only for LOFT scenes are:
   - Flight Safety VITAL IV [formerly McDonnell Douglas VITAL series]
   - Red fusion SP3 and SP3T
   - Link-Miles Image II.

   Additionally, and again, due to the limitations of early CGI visual systems, there are certain other systems that are exempt from the necessity of including runway numbers as a part of the specific runway marking requirements. These visual systems are:
   - Link NVS and DNVS.
   - Novo view 2500 and 6000.
   - Flight Safety VITAL series up to, and including, VITAL III, but not beyond.
   - Red fusion SP1, SP1T, and SP2.

3. Airport Signs must be able to be read at a distance of 200 feet when the simulator is not moving.

4. Where the installed visual system is not capable of producing blue colored lights for taxiway edge lighting, green lights may be used for taxiway centerline lights – in which case, taxiway edge lighting is not required.